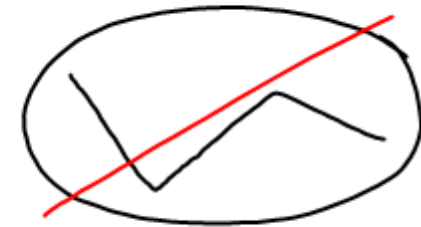


Polynomials

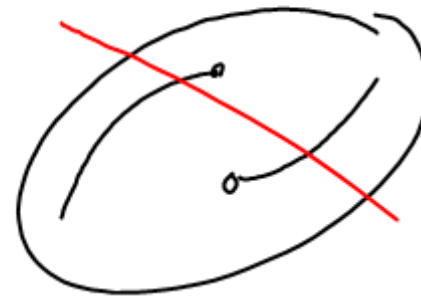
$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x^1 + a_0$$

Characteristics

Smooth, no points



Continuous



Degree - highest power

$$x^3 + x^2 - x + 7 \quad 3^{\text{rd}} \text{ degree}$$

$$x^6 + 3x^8 - 4x^2 + 5 \quad 8^{\text{th}} \text{ degree}$$

Leading Coefficient

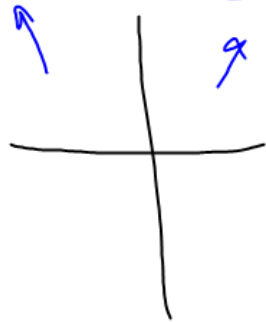
Number in front of
the highest-degreed term

$$3x^3 + 2x^2 - 7 \Rightarrow \text{L.C.} = 3$$

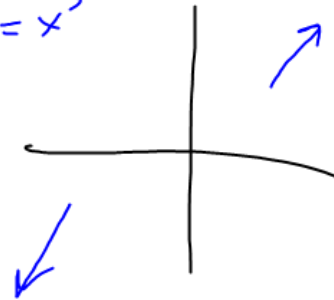
$$6x^2 - 3x^5 + 2x^4 \Rightarrow \text{L.C.} = -3$$

Leading coefficient test

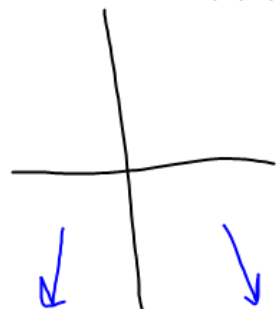
Even degree + positive
Leading coefficient
 $y = x^2$



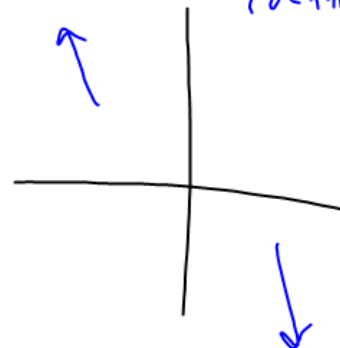
odd degree + positive
Leading coefficient
 $y = x^3$



Even degree + neg. Leading
coefficient
 $y = -x^2$



odd degree + neg. Leading
coefficient
 $y = -x^3$



Factors + Zeros

$$y = x^3 - x^2 - 2x$$

$$y = (x)(x-2)(x+1) \rightarrow \text{factors}$$

$$x = 0, 2, -1 \rightarrow \begin{array}{l} \text{zeros} \\ \text{solutions} \\ \text{roots} \\ \text{x-intercepts} \end{array}$$

Multiplicity

$$3(x-1)^2(x+2)^3 \Rightarrow 3(x-1)(x-1)(x+2)(x+2)(x+2)$$

zeros: 1, 1, -2, -2, -2

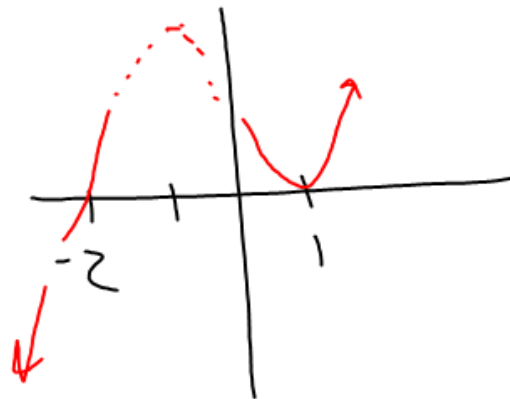
zeros: 1, -2

multiplicity
of
2

multiplicity
of
3

With
Even multiplicities, the graph bounces at that zero

With odd multiplicities, the graph crosses at that zero



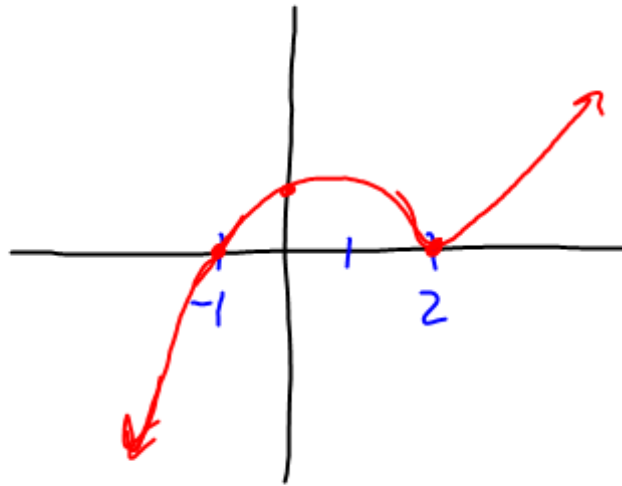
Sketch by hand

$$y = \frac{1}{3}(x+1)(x-2)^2$$

zeros -1, 2

mult.
of
(odd)
crosses

mult.
of
2
(even)
bounce



Leading coefficient = pos.
Degree = 3rd

Plot

$$x=0$$

$$\frac{1}{3}(0+1)(0-2)^2 = 4$$

Plot

$$x=3$$

$$\frac{1}{3}(3+1)(3-2)^2$$

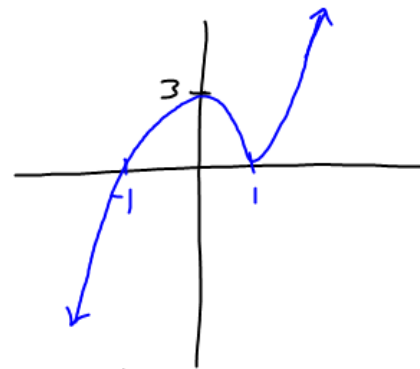
Plot

$$x=-2$$

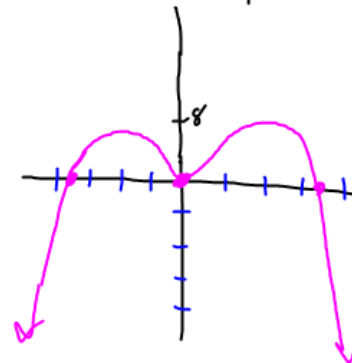
$$\frac{1}{3}(-2+1)(-2-2)^2$$

Sketch by hand

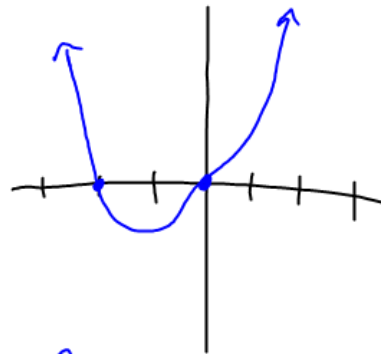
(a) $y = 3(x-1)^2(x+1)^3$



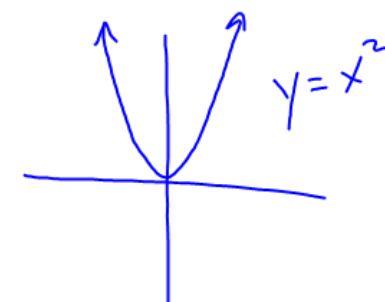
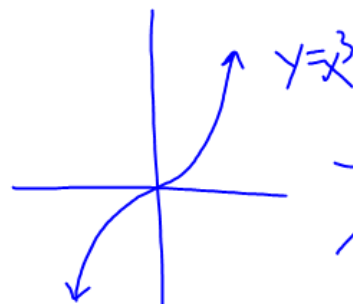
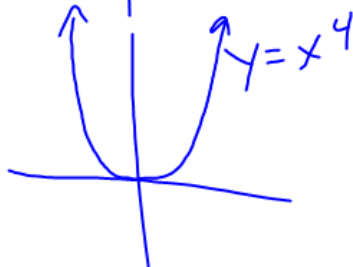
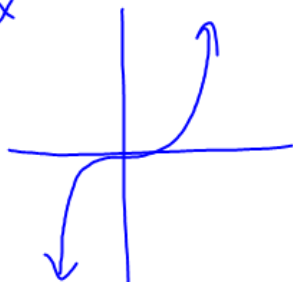
(b) $y = -\frac{1}{4}(x)^2(x+\sqrt{12})(x-\sqrt{12})$



(c) $y = (x+2)(x)^3$

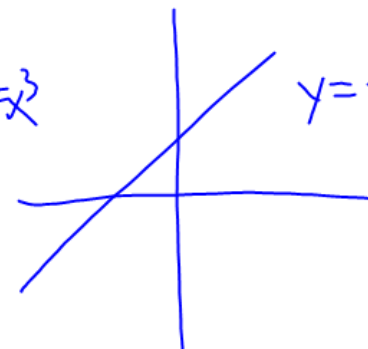


$y = x^5$



$y = x^3$

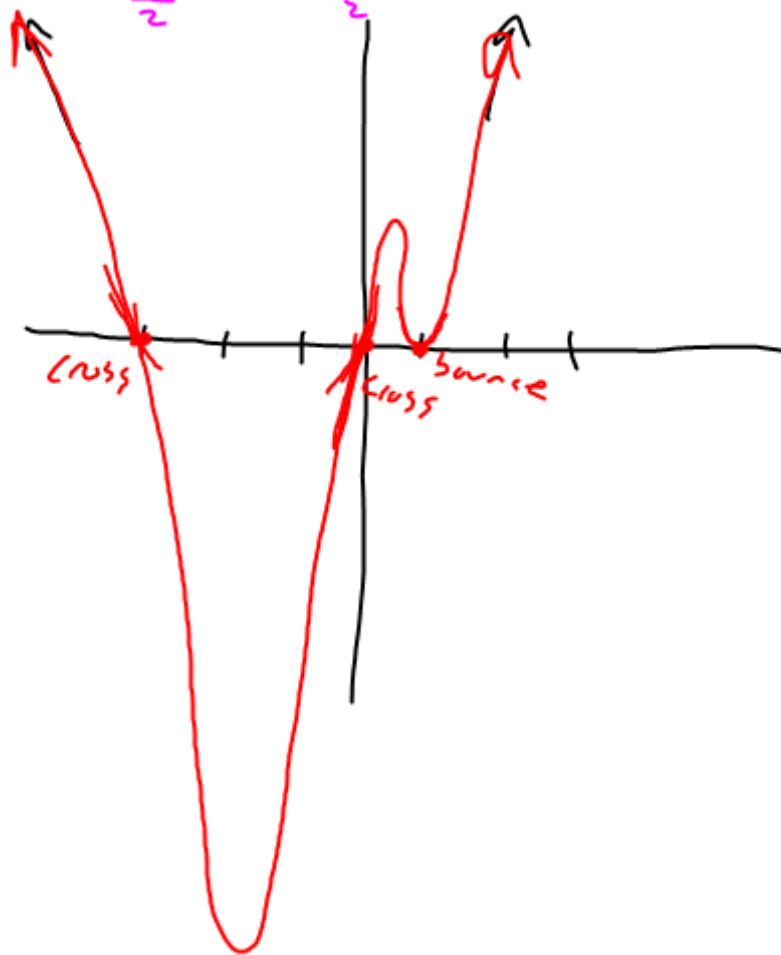
$y = x^1$



Graph by hand

$$3(x-1)^2(x+3)(x)$$

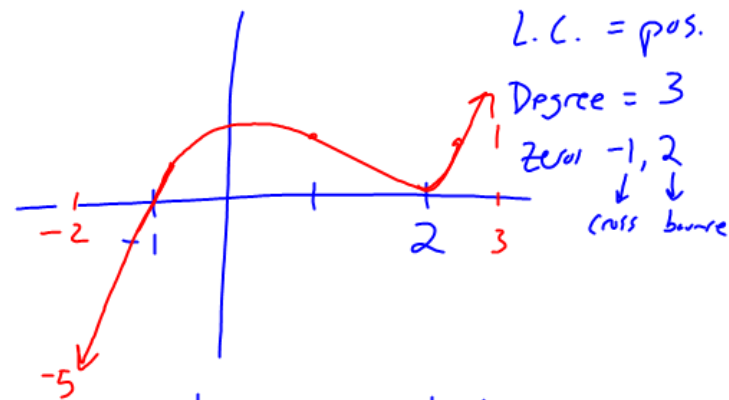
$\begin{matrix} -2 & -2 & -2 \\ \frac{1}{2} & \frac{1}{2} & \frac{1}{2} \end{matrix}$



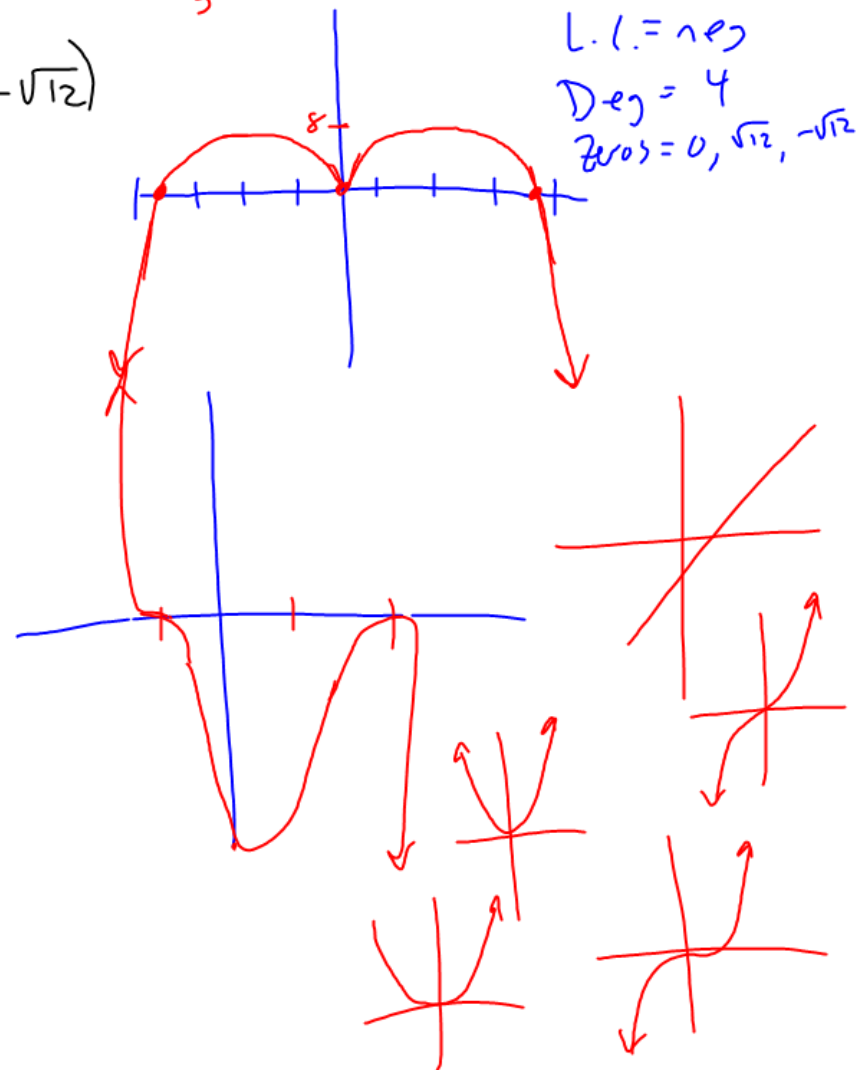
- Zeros
- power 4th degree
- Leading coefficient

Graph by hand

(a) $\frac{1}{3}(x+1)(x-2)^2$



(b) $-\frac{1}{4}(x)^2(x+\sqrt{12})(x-\sqrt{12})$



(c) $-2(x+1)^5(x-2)^4$

L.C. = neg
Deg = 9
Zero: -1, 2
cross bounce

Sect. 2.2Vocab

#1-6

Problems

1-8, 9-12(1), 17-24(2), 28, 32, 35, 38, 45, 49, 53-60(1),
61-72(2)

1 Quiz

① Complete the square and find the zeros + vertex

$$y = 2x^2 + 8x + 3$$

② Write an equation for the graph

